MEDCOM POWER MONITORING AND RELIABILITY CENTERED MAINTENANCE IMPLEMENTATION

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POWER MONITORING/RCM IMPLEMENTATION

- Background
- This Years Efforts and Goals
- Selected Sites
- Method of Implementation
- Time Line for Implementation
- Findings and Scope of Work at Each Site
- Demonstration of Power Monitoring
- Questions and Comments

BACKGROUND

- **Reliability Centered Maintenance**
  - **What is it?**
  - **How it has evolved at MAMC**
  - **Action we have Taken**
  - **Benefits**

WHAT IS RELIABILITY CENTERED MAINTENANCE

- **Optimal mix of various maintenance practices to ensure efficient and reliable facility operation**
  - **Preventative (Time Based)**
  - **Run to Failure**
  - **Predicative (Monitored)**
    - » **Vibration Analysis**
    - » **Oil Analysis**
    - » **Infrared Analysis**
  - **Proactive (Correcting the problem not just the symptoms)**

RCM EVOLUTION AT MAMC and the WRMC

- **Since Occupancy of MAMC, FMD has used various maintenance strategies(I.e. not optimal)**
  - **Preventative (80%)**
  - **Predictive (10%)**
    - **IR of Electrical Panels**
    - **Centrifugal Chiller Oil Analysis**
    - **Eddy Current Inspection of Chiller Tube Bundles**
  - **Proactive (5%)**
  - **Run to Failure (5%)**

RCM EVOLUTION AT MAMC CONT…

- **In 1997 began to investigate utilization of more predictive maintenance tasks**
- **Why?**
  - **It appeared that workers were spending a lot of time maintaining equipment but we were still see equipment failures**
    - » **i.e. Air Handlers fan bearings**
  - **Even though we were performing predicative methods we were still accomplishing preventative tasks**
    - » **i.e. IR of electrical panels**

RCM EVOLUTION CONT.…’

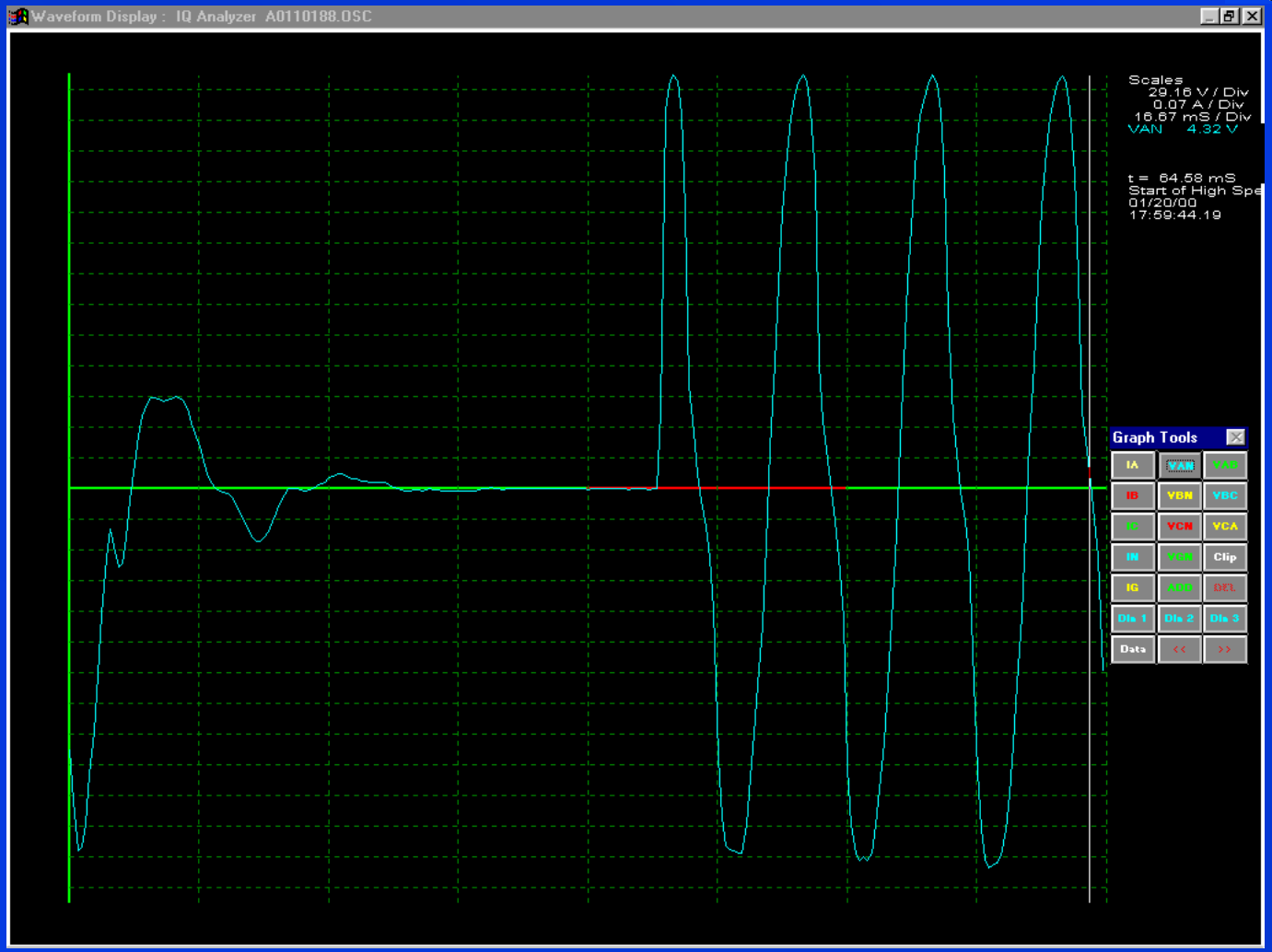
- Began testing vibration 22 items on a quarterly basis
- Equipment testing has been extended to annual for most items
- Developed various documents to assist facility staff in implementation of RCM in other facilities

RCM BENEFITS

- Identify repairs before failure can occur and emergency repairs are required
- Can allow for better planning of repairs (justification)
- Can be used as a guide for evaluating the effectiveness of a maintenance program or for rational to modify a maintenance practice
- Provide the mechanic a better understanding of his/her equipment
- Equipment acceptance testing

POWER MONITORING

- Equipment malfunction often occurs with power fluctuations, but it's not detected.
- Monitoring of electrical power after an anomaly is often worthless.
- Vendors blame equipment failure on "bad" power.
- Meter accuracy, connectivity, and data capture capabilities is critical.
- What's the payback for the metering system?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FY00 POWER MONITORING/RCM IMPLEMENTATION

- **Based on the benefits and value added information from the RCM and Power Monitoring seen at MAMC**
- **MEDCOM Funded $1.0 Mil for implementation and equipment installation**
  - **With the exception of MAMC personnel coordination and report development all funds will be used outside the WRMC**

IMPLEMENTATION

- **GOALS (Power Monitoring)**

- **Establish an utility monitoring platform**
- **Identify and resolve potential problems**
- **Provide accurate metering capabilities**
- **Share data and ideas with other regions**
- **Export expertise to remote sites**
- **Provide solid system to build upon**

IMPLEMENTATION

- **GOALS (RCM)**
  - **Establish a baseline for equipment condition**
  - **Validate the need for equipment repair and/or replacement**
  - **Prove that implementation of these techniques need to be done throughout MEDCOM as part of a normal maintenance program**
  - **Providing another means to evaluate the effectiveness of maintenance program**
  - **Provides an additional tool to accept repaired or replaced equipment or an entire facility**

SELECTED SITES

- Ft. Dectrick
- Walter Reed Army Medical Center
- Brooke Army Medical Center
- Madgan Army Medical Center (WRMC funded and K funded)
- Weed Army Community Hospital (WRMC funded)

METHOD OF IMPLEMENTATION

- **TEAM APPROACH**
  - MEDCOM
  - CTX (MAMC & CERL)
  - FACILITY STAFF
- **RESPONSIBILITIES**

TIME LINE OF IMPLEMENTATION (RCM)

- Met with Facility personnel and MEDCOM (Dec 1)
- Site Visit and Equipment Selection
- Contracts Awarded
- Initial testing Completed
- Required Repairs Completed
- Recheck
- Data Collection and Benefit Analysis
- Development of follow-up testing plan

TIME LINE OF IMPLEMENTATION (POWER MONITORING)

- Met with Facility personnel and MEDCOM (Dec 1)
- Site Visit and Equipment Selection
- Contracts Awarded
- Precon
- Installation Complete
- Acceptance Testing
- Data Collection and Benefit Analysis

FINDINGS AND SCOPE OF WORK AT EACH SITE (RCM)

- **FT DETRICK FINDINGS**
  - Has an extensive IR program in place
  - Currently utilizes oil analysis for their generators
    - » oil change interval extended to 3 yr. cycle from annual
  - Has done some work with vibration analysis on pumps and fans
  - Performs equipment alignment utilizing reverse dial indicators
  - Utilizes Eddy current inspection on chillers

FINDINGS AND SCOPE OF WORK AT EACH SITE

- **FT. DETRICK SCOPE OF WORK**
  - Obtain data from IR testing, oil analysis and eddy current inspection
  - Provide vibration testing for approximately 250 pieces of equipment
  - Provide the facilities an additional IR camera, laser alignment equipment and vibration monitoring equipment's (if data can be of value)
  - Install vibration monitors on exhaust fans that serve the trash incinerator
  - Based on results develop a follow on testing plan

FINDINGS AND SCOPE OF WORK AT EACH SITE (RCM)

- **WALTER REED ARMY MEDICAL CENTER FINDINGS**
  - **Has performed some IR on electrical panels (has not been done in the last few years and has not included main distribution panel)**
  - **Generator oil changes done on a annual basis - no oil analysis performed**
  - **Has not done any vibration monitoring**

FINDINGS AND SCOPE OF WORK AT EACH SITE (RCM)

- **WALTER REED ARMY MEDICAL CENTER SCOPE OF WORK**
  - Perform oil analysis on generators and evaluate if oil change intervals can be changed
  - Perform vibration testing on approximately 250 pieces of equipment
    - » air handlers, medical and vacuum pumps, medical air compressors
  - Perform IR surrey on the electrical distribution system
  - Based upon results develop a follow-on testing plan

FINDINGS AND SCOPE OF WORK AT EACH SITE (RCM)

- **BROOKE ARMY MEDICAL CENTER FINDINGS**
  - Performs quarterly oil analysis on generators and chillers. However changes oil on an annual basis
  - Performs eddy current inspection on chiller tube bundles
  - Has a program to perform IR surveys on electrical distribution and steam traps
  - Does perform alignment on pumps utilizing dial indicators
  - Does not perform vibration testing of fans and pumps

FINDINGS AND SCOPE OF WORK AT EACH SITE (RCM)

- **BROOKE ARMY MEDICAL CENTER SCOPE OF WORK**
  - Check with generator and chiller mfg. about the feasibility of changing oil based upon results from analysis
  - Obtain data from IR surveys and eddy current inspections
  - Perform vibration testing on approximately 200 to 250 pieces of equipment
  - Based upon testing results develop a follow on testing plan

FINDINGS AND SCOPE OF WORK Ft. Detrick (POWER MONITORING)

- Need to monitor entire installation electrical system.
- Complex installation with many tenant activities.
- Seasonal loads require change in power requirements.
- Remote sites requires wireless connection to meters.
- Combine with work order system.
- 15 meters including (2) incoming 34 KVA step-down transformer meters.

FINDINGS AND SCOPE OF WORK AT WRAMC (POWER MONITORING)

- One building with three independent power sources.
- Electrical system is a network system, very reliable.
- Several unexplained localized electrical outages.
- Four identical power quadrants .
- Combination of meter abilities.
- 12 high quality meters on input.
- 16 standard meters on individual switchgear.

FINDINGS AND SCOPE OF WORK AT BAMC (POWER MONITORING)

- Recent unexplained outage could have been tracked with system installed.
- Larger single facility.
- 17 meters total.
- 4 Incoming primary power.
- 6 double ended switchgear.

FINDINGS AND SCOPE OF WORK AT MAMC (POWER MONITORING)

- Tested several types of equipment before selecting current devices.
- Capabilities of monitoring from anywhere on local area network and from dial-up.
- 4 meters on incoming primary power
- 16 meters on 8 double ended switchgear.
- Analog input devices on generators.
- 29 meters on Automatic Transfer Switches (remaining 6 to be installed).
- Project time, about two years.

FINDINGS AND SCOPE OF WORK AT WACH (POWER MONITORING)

- Unreliable power from the base.
- Generators run during surgery and x-ray.
- No one on site to monitor electrical system.
- Combination of data transfer mediums
- Need to meter multiple buildings.
- 2 Clinics, 2 locations in hospital, and generator loads.

DEMONSTRATION OF THE POWER MONITORING SYSTEM

QUESTIONS AND DISCUSSION